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(58) Field of search

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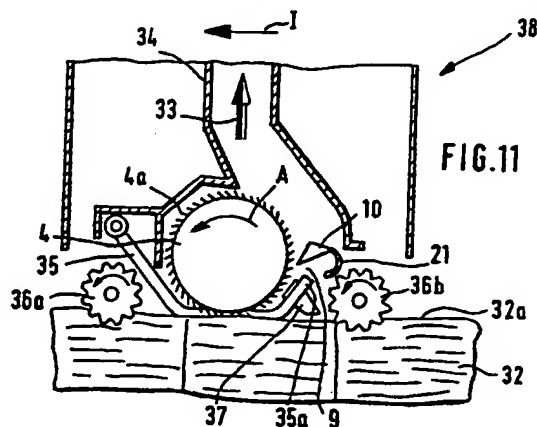
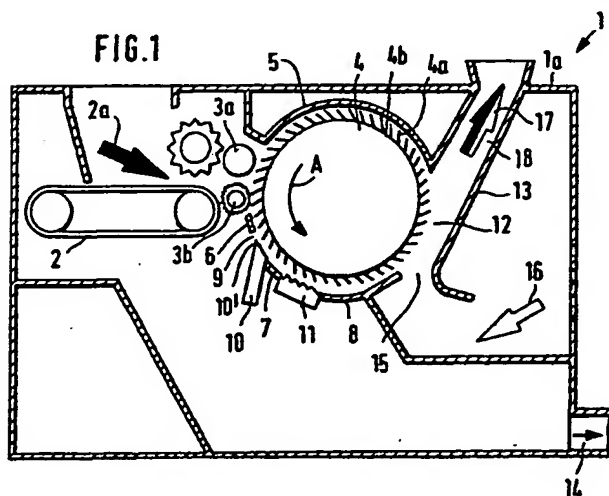
## (54) Device for cleaning and opening textile fibre material

(57) In a device for cleaning and opening textile fibre material, especially cotton, after a feed device (2) there is arranged a rotating spiked or needled roller (4), which is surrounded by a housing (5, 6, 7, 8) that has at least one opening (9) for removal of foreign material, such as waste particles, bits of leaf, seed husks, pieces of stem, sand and so on.

To produce a device which is of simple construction and allows an improved cleaning of the fibre material, at least one separating blade (10) is associated with the spikes or needles (4a) of roller (4) and has a blade edge (10') directed against the direction of rotation of the roller 4.

The cleaning and opening device may form part of a flock feeder or a bale opener.

The angle of inclination of the spikes or needles decreases in the direction of rotation of roller 4.



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FIG. 3a

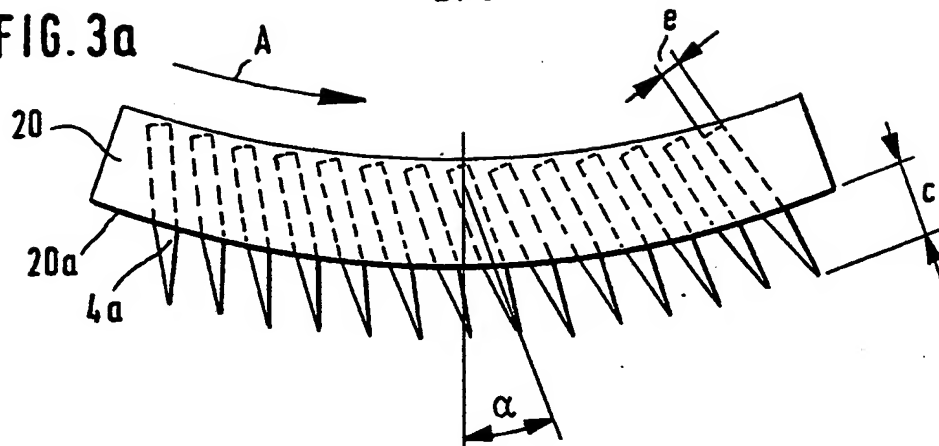


FIG. 3b

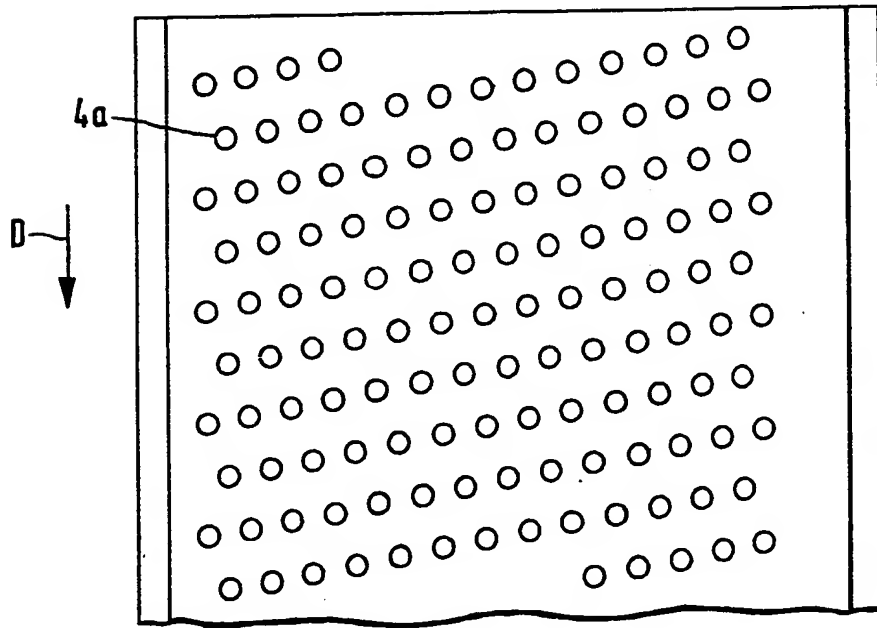


FIG. 3c

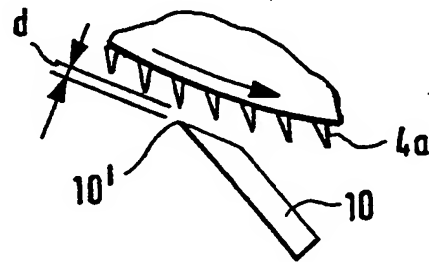


FIG. 4

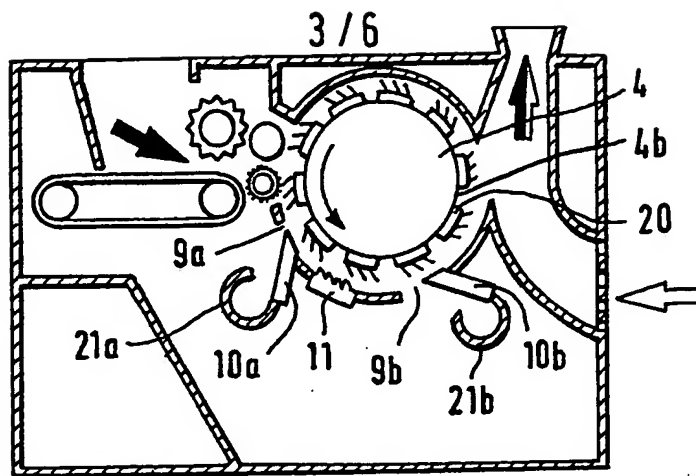


FIG. 5

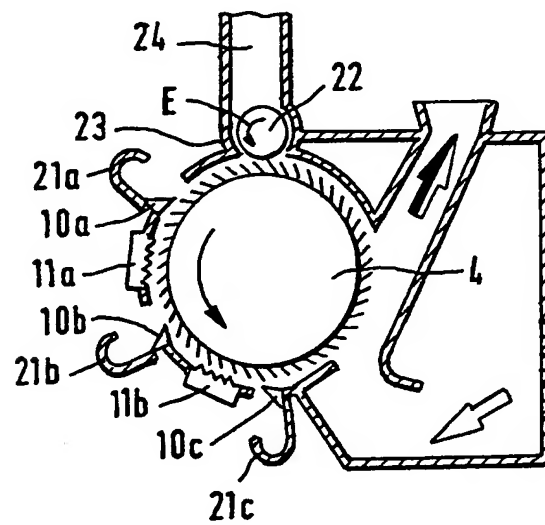
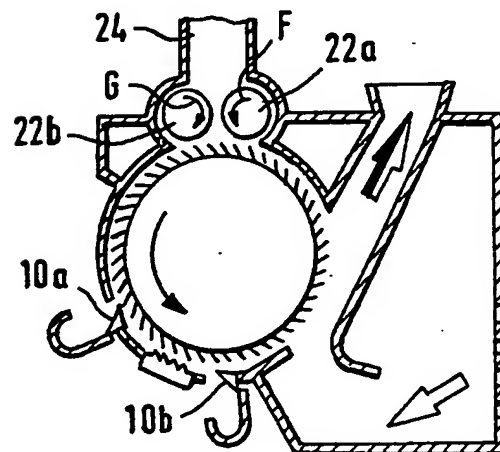
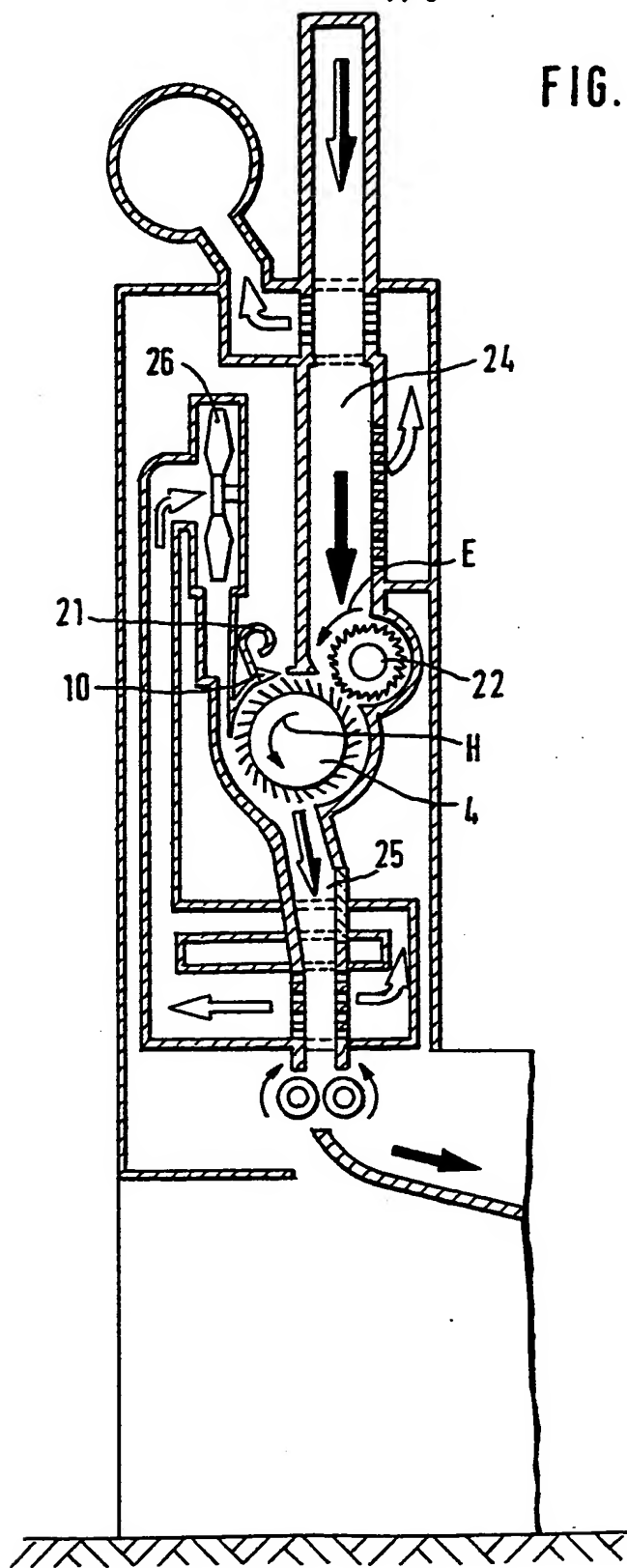


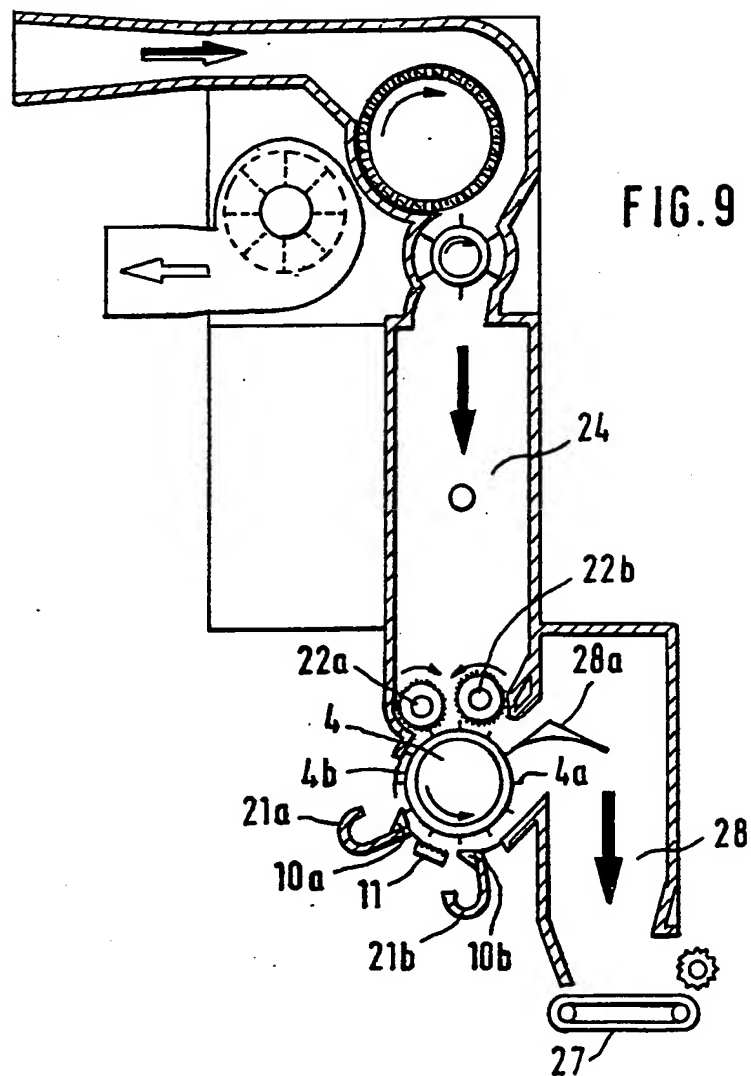
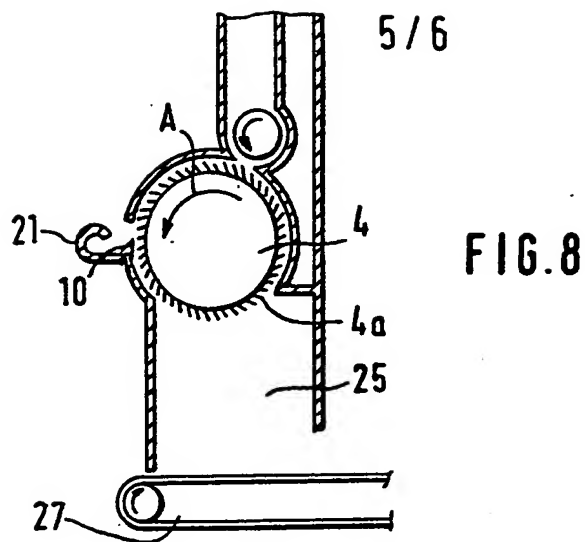
FIG. 6



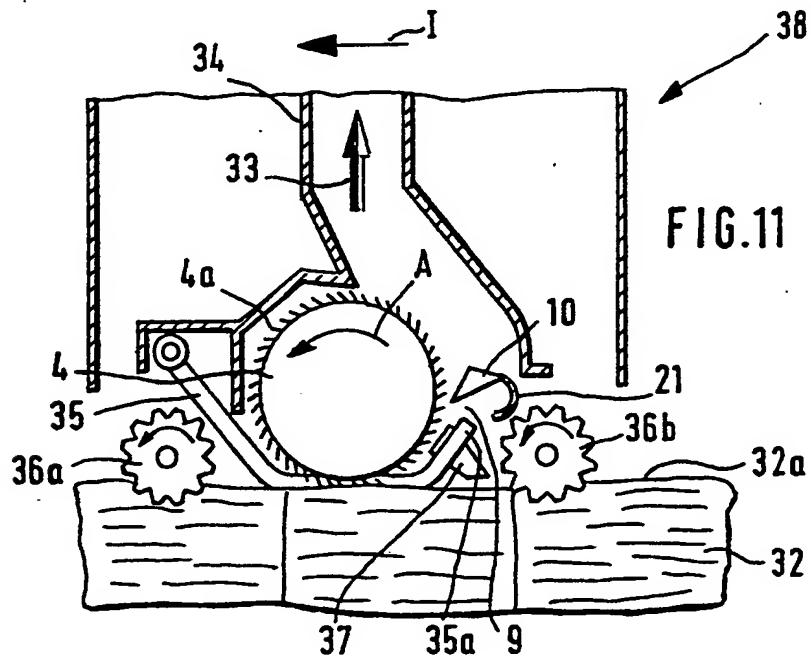
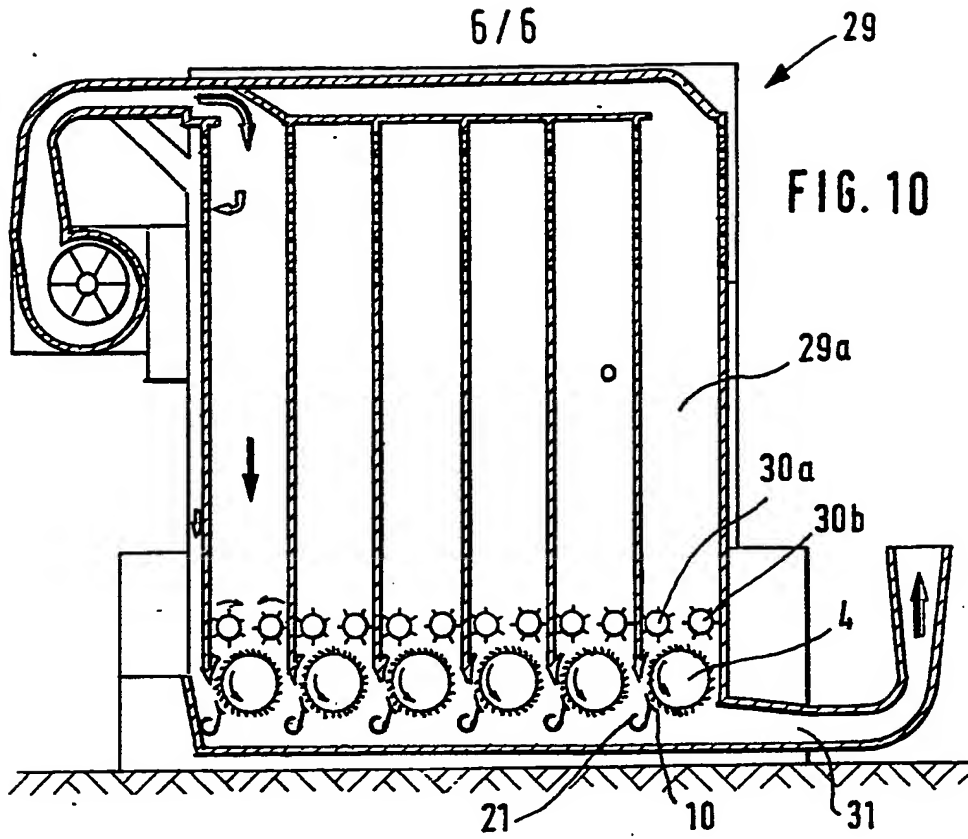
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FIG. 7





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Device for cleaning and opening textile fibre material

The invention is concerned with a device for cleaning and opening textile fibre material, especially cotton, with a rotating spiked or needled roller.

A known device has a solid spiked roller (spiked drum), which, as an opener roller, co-operates with a grid arranged beneath it. The grid surface has a plurality of openings which are in the form, for example, of holes or narrow slots aligned parallel with the axis of the solid spiked roller. The grid surface is curved coaxially in relation to the solid spiked roller, and is arranged at a distance from the impact circle of the needles or spikes so that the fibre material is guided over the surface of the grid. Above the solid spiked roller, at a distance therefrom, there is a smooth horizontal cover. A pneumatic suction device for the fibre material is associated with the solid spiked roller. The foreign material passes downwards through the openings in the grid into a large waste collection chamber. The grid is an expensive item in terms of production engineering. In addition, the openings in the grid surface can become blocked during operation, in particular in the processing of cotton, which is contaminated with sticky substances, such as honeydew. The cleaning action is impaired as a consequence.

It is an object of the invention to provide a device of the kind mentioned above, which avoids or mitigates



expedient for the distance between the blade edge of the stripping blade and the enveloping surface for the free ends of the spikes or needles to be approximately between 0.5 and 5 mm. A clothed carding element is preferably arranged after the separating blade. For preference, a suction device for the waste and so on is associated with the separating blade. The spiked or needled roller may advantageously be associated with an opener roller of a bale opener, of a flock-mixing device or of a cleaner. The separating edge of the separating blade preferably has a guide element associated with it, the distance of which from the spiked or needled roller is adjustable. Between the separating edge and the cover or the guide element there is expediently a separating opening for the foreign material. A tangential suction device for the fibre material is preferably located at the spiked or needled roller. Above the spiked or needled roller there is preferably a curved covering surface. Below the spiked or needled roller there is advantageously a curved covering surface. The spiked or needled roller is expediently associated with a flock-feeding device, for example a flock feed shaft.

Embodiments of the invention are described in detail below with reference to the accompanying schematic drawings, of which

Fig. 1 is a side view of a cleaning and opener device with a spiked roller and a separating blade,

known device, the openings do not become blocked. The spikes or needles have the advantage that they remove the fibre material from the feed device carefully and not too aggressively. An opening operation that avoids damage  
5 to the fibres while thoroughly cleaning out the fibre material is achieved by this combination of the spikes or needles with the separating blade. A further advantage consists in that the delivery of fibres from the needles or spikes is facilitated by the suction of an air current  
10 (stripping). Within a cotton-cleaning plant comprising several cleaning machines, the device can be arranged in front of a fine cleaner, for example a saw-toothed cleaner; because its cleaning-out ability is improved, especially its ability to clean out relatively coarse  
15 foreign material, the device eases the stress on the subsequent machines, so that the design of these machines can be improved to render the opening and cleaning processes of the entire cleaning plant more uniform.

The spikes or needles are expediently set obliquely  
20 in the direction of rotation relative to the radial orientation of the spiked or needled roller. The angle of inclination of the spikes or needles preferably decreases in the direction of rotation. For preference, the height of the spikes or needles above the surface  
25 from which they project is about 4 to 20 mm. Advantageously, the spikes or needles are arranged on the surface of the roller or a supporting body at a density of about 0.5 to 2 spikes or needles per cm<sup>2</sup>. It is

expedient for the distance between the blade edge of the stripping blade and the enveloping surface for the free ends of the spikes or needles to be approximately between 0.5 and 5 mm. A clothed carding element is  
5 preferably arranged after the separating blade. For preference, a suction device for the waste and so on is associated with the separating blade. The spiked or needled roller may advantageously be associated with an opener roller of a bale opener, of a flock-mixing device  
10 or of a cleaner. The separating edge of the separating blade preferably has a guide element associated with it, the distance of which from the spiked or needled roller is adjustable. Between the separating edge and the cover or the guide element there is expediently a  
15 separating opening for the foreign material. A tangential suction device for the fibre material is preferably located at the spiked or needled roller. Above the spiked or needled roller there is preferably a curved covering surface. Below the spiked or needled roller  
20 there is advantageously a curved covering surface. The spiked or needled roller is expediently associated with a flock-feeding device, for example a flock feed shaft.

Embodiments of the invention are described in detail below with reference to the accompanying schematic  
25 drawings, of which

Fig. 1 is a side view of a cleaning and opener device with a spiked roller and a separating blade,

- Fig. 2 shows the co-ordination of a guide element with the separating blade, the distance of the guide element from the spiked roller being adjustable,
- 5 Fig. 3a is a side view of a holding element with needle-spikes,
- Fig. 3b is a plan view of the breaking-through surfaces of the needle-spikes breaking through the holding element according to
- 10 Fig. 3a,
- Fig. 3c shows the spacing between the tips of the spikes and the separating edge of the blade,
- 15 Fig. 4 shows a device with two separating blades, each with an associated suction hood, and one fixed carding element,
- Fig. 5 shows a device with three separating blades and with a flock take-in device including a slow-speed take-in roller arranged above the spiked roller,
- 20 Fig. 6 shows a device as in Fig. 5 but with a flock take-in device comprising two take-in rollers,
- 25 Fig. 7 shows a device on a flock-feeding arrangement with an upper reserve shaft and lower feed shaft,
- Fig. 8 shows a device on a flock-feeding

arrangement with a lower feed shaft  
without compaction and with downward  
ejection of the fibres,

Fig. 9 shows a device on a flock-charging  
arrangement with adjacent feed shaft  
without compaction and with fibres being  
ejected upwards into the feed shaft,

Fig. 10 shows a device below the filling  
chamber of a multi-chamber mixer and

Fig. 11 shows a device on the take-off head of a  
bale opener.

The cleaning device 1 arranged in a housing 1a has  
the fibre material to be cleaned, in particular cotton,  
fed to it in flock form. This is effected, for example,  
by a conveyor belt 2. The flock lap (represented by  
arrow 2a) is fed by means of two slow-speed feed rollers  
3a, 3b, while undergoing squeezing, to a rotating spiked  
roller 4 which is rotatably mounted in the housing 1a and  
rotates anti-clockwise as seen in Fig. 1 (arrow A). A  
cylindrical jacket 4b is provided over its entire  
surface with obliquely set steel spikes 4a. The clothed  
roller has a diameter of, for example, 350 to 450 mm, and  
a speed of rotation of, for example, 800 to 900 rev/min.

The spiked roller 4 is surrounded above by a curved  
cover 5 and below by further covers 6, 7, 8. The covers  
6 and 7 leave clear a separating opening 9 for the  
discharge of foreign material, the size of the separating  
opening 9 being adjustable (see Fig. 2). The separating

opening 9 has associated with it a separating blade 10, which has a blade edge 10' directed against the direction of rotation A of the spiked roller 4. The distance of the blade edge 10' from the outer circle (envelope) of the spikes 4a (see Fig. 3c) is expediently adjustable. A clothed fixed carding element 11 is arranged between the covers 7 and 8. The covers 5 and 8 leave clear an opening 12, at which a tangential suction device 13 for the fibre material is arranged.

10       The mode of operation is as follows: The lap comprising fibre flocks is fed by the feed rollers 3a, 3b, while undergoing squeezing, to the spiked roller 4, which combs through the fibre material and takes up tufts of fibre on its spikes 4a. As the spiked roller 15 4a passes the separating opening 9 and the separating edge 10', according to the circumferential speed and curvature of this roller and the size of the separating opening 9, foreign material and short fibres are flung out of the fibre material in particular because of the centrifugal force. The foreign material can be sucked 20 off, for example, by a suction device 14. After passing the cover 8, the fibre material is detached from the spiked roller 4a, the detachment being brought about by the incoming air 16 entering through the suction slot 15 25 and also the centrifugal force, and passes through the fibre suction channel 18 (illustrated by arrow 17) to the subsequent fibre-processing device.

Fig. 2 shows that at one end of the cover 6 there

is arranged a guide element 19, which is arranged before (upstream of) the separating edge 10', viewed in the direction of rotation A. Between the guide element 19 and the separating edge 10' there is the separating opening 9. At one end of the guide element 19, which is arranged in a U-shape, there is a cylindrical extension 19a which co-operates with a recess 6a in the cover 6 to form a hinge. The middle straight part 19b extends the cover 6. The guide element 19 can be turned in the direction of arrows B and C so that the distance  $a$  from the outer circle of the spikes 4a and the size  $b$  of the separating opening 9 are adjustable.

Fig. 3a shows a needle board 20, for example of wood, bent to form a segment, a number of which boards are fixed to the circumferential face 4b of the spiked roller 4 (see Fig. 4). The spikes 4a, pointed at one end, are set obliquely in the direction of rotation A at an angle  $\alpha$ , for example 15 to 25°, relative to the radial orientation of the spiked roller 4. The height  $c$  of the spikes 4a above the fixing surface 20a is, for example, 4 to 20 mm. According to the illustration in Fig. 3b, the spikes 4a are arranged on the surface 20a at a density of about 0.5 to 2 spikes per  $\text{cm}^2$ . (The lower limit of 0.5 is statistical and relates to the number of needles, not to the needles as such, which are present only as whole needles (0.5 spikes per  $\text{cm}^2$  equals 1 spike per 2  $\text{cm}^2$ ). D denotes the axial direction of the spiked roller 4. The diameter of the spikes 4a is

denoted by  $\underline{e}$ , for example 2 to 4 mm. The distance  $\underline{d}$  between the blade edge 10' and the envelope of the free ends of the spikes 4a, shown in Fig. 3c, is approximately between 0.5 and 5 mm.

5        In the arrangement shown in Fig. 4, a number of needle boards 20 with spikes 4a fitted therein are arranged on the circumferential surface 4b of the spiked roller 4. Below the spiked roller 4 there are two separating blades 10a, 10b each with a respective  
10 associated separating opening 9a, 9b. Each separating blade 10a, 10b has associated with it a respective suction device 21a, 21b (suction hood) for foreign material separated by the blade; each suction device is arranged below the respective separating edge 10'. The  
15 spikes or needles may, if desired, be so arranged on a needle board that the angle of inclination of the spikes or needles decreases across the needle board in the direction of rotation.

Fig. 5 shows a cleaning device with a flock draw-  
20 in device (flock feed), comprising a slow-speed take-in roller 22 that co-operates with a take-in counter surface 23, arranged above the spiked roller 4; the take-in roller 22 draws the fibre material from a reserve shaft 24 arranged above it. At its circumference, the spiked  
25 roller 4 has three separating blades 10a, 10b, 10c, each with suction hood 21a, 21b, 21c, and two fixed carding segments 11a, 11b associated with it.

Fig. 6 shows an embodiment in which two draw-in



rollers 22a, 22b draw the fibre material from a vertical reserve shaft 24 and feed it to the spiked roller 4, which has two separating blades 10a, 10b associated with it.

5        Fig. 7 shows a flock-feeding device, for example of the Trützschler EXACTAFEED FBK type. The fibre material is drawn by the take-in roller 22 from the upper reserve shaft 24 and fed to a high-speed spiked roller 4 (direction of rotation H) which ejects the fibre material into  
10 a lower feed shaft 25, in which it is compacted by an air current from a fan 26. The spikes 4a of the spiked roller 4 have a separating blade 10 with a suction hood 21 associated with them.

      Fig. 8 shows a flock-feeding device with a lower  
15 feed shaft 25 operating without compaction of the fibre material. The fibre material is ejected by the needled roller 4 downwards in the direction of a conveyor belt 2. A separating blade 10 with suction device 21 is associated with the spikes 4a of the spiked roller 4.

20        Fig. 9 shows a flock-feeding device with an upper reserve shaft 24, from which the fibre material is drawn by two take-in rollers 22a, 22b and fed to a high-speed spiked roller 4. The cylindrical jacket 4b is provided on its surface with radially set steel spikes 4a. The  
25 spiked roller 4 ejects the fibre material upwards towards a guide element 28a, by which it is guided into a feed chamber 28 arranged laterally of the spiked roller 4 and from there passes onto a conveyor belt 27 arranged below.

Two separating blades 10a, 10b with associated suction hoods 21a and 21b respectively, and one fixed carding element 11 are associated with the spiked roller 4.

Fig. 10 shows a fibre mixer 29, for example of the Trützschler Multimixer MPM type. There are a number of mixing chambers 29a arranged vertically side by side, from the lower end of which the fibre material is drawn by slow-speed take-off rollers 30a, 30b. Below each pair of take-off rollers 30a, 30b there is a high-speed spiked roller 4, which removes the fibre material from the take-off rollers 30a, 30b; in so doing the fibre material is loosened into flocks and subsequently delivered to a pneumatic mixing channel 31 arranged below the spiked rollers, from which it is sucked by a suction device (not illustrated). Each spiked roller 4 has associated with it a separating blade 10 and an accompanying suction device 21 for foreign material.

Fig. 11 shows the take-off head 38 of a bale opener, for example of the Trützschler BLENDOMAT BDT type. A spiked roller 4 (rotating in the direction A) detaches flocks from the surface 32a of the fibre bale 32 and those flocks are sucked by an air current 33 through a channel 34. The spiked roller 4 has associated with it a grid (holding down member) comprising several grid bars 35 that press onto the surface 32a; the spikes 4a penetrate through the gaps (oriented at right angles to the axis of the spiked roller 4) of the grid bars. Parallel with the axis of the spiked roller 4 there are

the separating blade.

8. A device according to any one of claims 1 to 7, in which a suction device for the waste is associated with the separating blade.

5 9. A device according to any one of claims 1 to 8, in which before the separating edge of the separating blade there is arranged an adjustable guide element.

10 10. A device according to claim 9, in which the spacing of the guide element from the spiked or needled roller is adjustable.

11. A device according to any one of claims 1 to 10, in which immediately upstream of the separating edge there is the separating opening for removal of fibre material.

15 12. A device according to any one of claims 1 to 11 in which a duct extending substantially tangentially from the spiked or needled roller is provided together with means for generating an airstream along the duct for carrying fibre away from the spiked or needled roller.

20 13. A device according to any one of claims 1 to 12, in which the housing includes at least one curved covering surface above the spiked or needled roller.

14. A device according to any one of claims 1 to 13,

Claims

1. A device for cleaning and opening textile fibre material with a rotating spiked or needled roller at least partly surrounded by a housing with at least one opening for removal of foreign material characterized in that at least one separating blade is associated with the spikes or needles of the roller, which separating blade has a blade edge pointing against the direction of movement of the roller in the vicinity of the separating blade.
2. A device according to claim 1, in which the spikes or needles are inclined forwardly relative to the radius of the roller.
3. A device according to claim 1 or 2, in which the angle of inclination of the spikes or needles decreases in the direction of rotation.
4. A device according to any one of claims 1 to 3, in which the height of the spikes or needles above the surface of the roller is about 4 to 20 mm.
5. A device according to any one of claims 1 to 4, in which the spikes or needles are arranged at a density of about 0.5 to 2 spikes or needles per cm<sup>2</sup>.
6. A device according to any one of claims 1 to 5, in which the distance between the separating edge of the separating blade and the envelope of the free ends of the spikes or needles is approximately between 0.5 and 5 mm.
7. A device according to any one of claims 1 to 6, in which a clothed fixed carding element is arranged after

the separating blade.

8. A device according to any one of claims 1 to 7, in which a suction device for the waste is associated with the separating blade.

5 9. A device according to any one of claims 1 to 8, in which before the separating edge of the separating blade there is arranged an adjustable guide element.

10. A device according to claim 9, in which the spacing of the guide element from the spiked or needled roller is  
10 adjustable.

11. A device according to any one of claims 1 to 10, in which immediately upstream of the separating edge there is the separating opening for removal of fibre material.

15 12. A device according to any one of claims 1 to 11 in which a duct extending substantially tangentially from the spiked or needled roller is provided together with means for generating an airstream along the duct for carrying fibre away from the spiked or needled roller.

20 13. A device according to any one of claims 1 to 12, in which the housing includes at least one curved covering surface above the spiked or needled roller.

14. A device according to any one of claims 1 to 13, in which the housing includes at least one curved  
25 covering surface below the spiked or needled roller.

15. An apparatus for cleaning and opening textile fibre material, the apparatus including a cleaning and opening device according to any one of claims 1 to 14 and a feed

device for feeding textile fibre material to the cleaning and opening device.

16. An apparatus according to claim 15 which is a bale opener, the bale opener including an opener roller  
5 defining the spiked or needled roller of the cleaning and opening device.

17. An apparatus according to claim 15 which is a mixing apparatus for mixing fibre flocks, the mixing apparatus including an opener roller defining the spiked or needled  
10 roller of the cleaning and opening device.

18. An apparatus according to claim 15 which is a flock feeding apparatus for feeding fibre flocks, the feeding apparatus including an opener roller defining the spiked or needled roller of the cleaning and opening device.

15 19. An apparatus according to claim 18, in which the opener roller is associated with a flock feed shaft.

20. An apparatus according to claim 15 which is a cleaner, the cleaner including an opener roller defining the spiked or needled roller of the cleaning and opening  
20 device.

21. A device for cleaning and opening textile fibre material, the device being substantially as herein described with reference to and as illustrated by Fig. 1, Fig. 2, Fig. 3a, Fig. 3b and Fig. 3c of the accompanying  
25 drawings.

22. An apparatus for cleaning and opening textile fibre material, the apparatus being substantially as herein described with reference to and as illustrated by Fig. 1,

or by Fig. 4, or by Fig. 5, or by Fig. 6, or by Fig. 7,  
or by Fig. 8, or by Fig. 9, or by Fig. 10, or by Fig. 11  
of the accompanying drawings.